

**Amendments to the Claims:**

1. **(Currently Amended)** A method for determining a bandwidth required for meeting one or more quality-of-service ("QoS") criterion on a transmission link comprising the steps of:

generating a plurality of streams of traffic for the transmission link;

5       conducting a plurality of simulations of bandwidth for the link, based on generated traffic streams and using systematically varying values of the one or more QoS criterion; developing a statistical model of the transmission link based on the simulations, addressed to a relationship between the statistical model specifying a bandwidth requirement for achieving at least one of the and the one or more QoS criterion as a function of bandwidth, traffic load, queuing delay and packet loss, the model further specifying a link utilization ( $u$ ), defined as a ratio of traffic load ( $\tau$ ) on the link to link bandwidth ( $\beta$ ) ( $u = \tau/\beta$ ), as an algebraic function of queuing delay ( $\delta$ ) and delay probability ( $\omega$ )based on the simulations; and

10     applying the developed model to determine bandwidth required to meet the one or more QoS criterion on a link  
15      wherein the developed model is provided as a function of bandwidth, traffic load, queuing delay and packet loss.

2. **(Original)** The method of claim 1 wherein each of the generated traffic streams has a fixed traffic bit rate and the traffic bit rate varies from stream to stream.

3. **(Original)** The method of claim 1 wherein the streams of traffic are organized into packets and the traffic streams are defined by packet arrivals and sizes.

4. **(Original)** The method of claim 1 wherein the traffic streams are generated synthetically based on a statistical model.

5. **(Original)** The method of claim 4 wherein the statistical model is a Fractional Sum Difference model.

6. (Original) The method of claim 1 wherein the step of conducting plural simulations includes the sub-steps of:

choosing a trial bandwidth for a given simulation; and  
iteratively repeating the simulation with an incremental change in the trial

5 bandwidth until a QoS value realized for the simulation substantially matches a selected QoS criterion.

7. (Previously Presented) A method for determining a bandwidth required for meeting one or more quality-of-service ("QoS") criterion on a transmission link comprising the steps of:

generating a plurality of streams of traffic for the transmission link;

5 conducting a plurality of simulations of bandwidth for the link, based on generated traffic streams and using systematically varying values of the one or more QoS criterion;  
developing a model addressed to a relationship between bandwidth and the one or more QoS criterion based on the simulations; and

10 applying the developed model to determine bandwidth required to meet the one or more QoS criterion on a link;

wherein the developed model is of the form:

$$\log_2\left(\frac{u}{1-u}\right)=\mu+o_\delta \log_2(\delta)+o_\omega(-\log_2(-\log_2(\omega)))+\epsilon,$$

where  $u$  is the QoS utilization,  $\delta$  is the queuing delay,  $\omega$  is the delay probability,  $\epsilon$  is a random variable with mean 0 and variance  $\sigma^2(\epsilon)$ ,  $\mu$  is a constant for a given traffic stream, serving as a summary of the statistical properties of the stream, and  $o_\delta$  and  $o_\omega$  are empirically determined constants.

8. (Original) The developed model of the form claimed in claim 7 wherein:

$$o_\delta \cong 0.379, o_\omega \cong 0.863 \text{ and } \sigma^2(\epsilon) \cong 0.113$$

9. (Original) The developed model of the form claimed in claim 7 wherein:

$$\mu=o+o_\tau(\log_2(\tau)-24)+\zeta$$

where  $\zeta$  is a random variable with mean 0 and variance  $\sigma^2(\zeta)$  and  $o$  and  $o_\tau$  are empirically determined constants.

10. (Original) The developed model of the form claimed in claim 9 wherein:

$$o \cong 5.500, o_{\tau} \cong 0.709 \text{ and } \sigma^2(\zeta) \cong 0.036$$

11. (Previously Presented) A method for determining a bandwidth required for meeting one or more quality-of-service ("QoS") criterion on a transmission link comprising the steps of:

generating a plurality of streams of traffic for the transmission link;

- 5       conducting a plurality of simulations of bandwidth for the link, based on generated traffic streams and using systematically varying values of the one or more QoS criterion; developing a model addressed to a relationship between bandwidth and the one or more QoS criterion based on the simulations; and

- 10      applying the developed model to determine bandwidth required to meet the one or more QoS criterion on a link;

wherein the developed model is of the form:

$$\text{logit}_2(u) = o + o_{\tau}\tau + o_{\delta}\log_2(\delta) + o_{\omega}(-\log_2(-\log_2(\omega))) + \psi,$$

where  $u$  is the QoS utilization,  $\tau$  is the link bit rate,  $\delta$  is the queuing delay,  $\omega$  is the delay probability,  $\psi = \epsilon + \zeta$  is a normal random variable with mean 0 and variance

- 15      $\sigma^2(\psi) = \sigma^2(\epsilon) + \sigma^2(\zeta)$  and  $o, o_{\tau}, o_{\delta}$  and  $o_{\omega}$  are empirically determined constants.

12. (Original) The developed model of the form claimed in claim 11 wherein:

$$o \cong 5.500, o_{\tau} \cong 0.709, o_{\delta} \cong 0.379, o_{\omega} \cong 0.863 \text{ and } \sigma^2(\psi) \cong 0.119.$$

13 - 18 (Cancelled)